Sparks Road:
DRAINAGE REPORT

5Ŝ0ember 2017

Prepared by:
Encompass Engineering & Surveying
407 Swiftwater Blvd
Cle Elum, WA 98922

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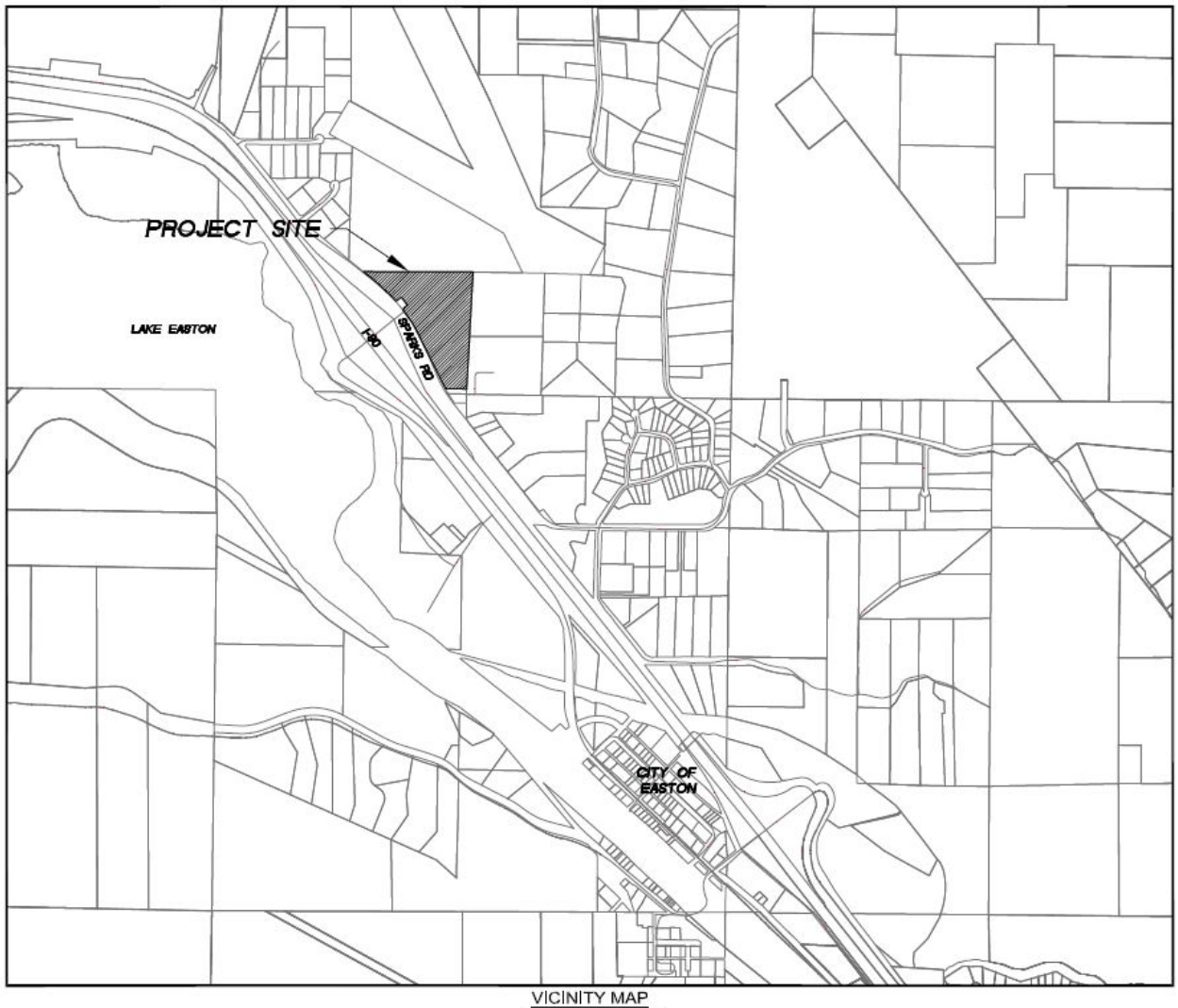
Appendix

I. INTRODUCTION

Per Kittitas County assessor records the Sparks Road Project site is located within Tax Parcel No. 778834, at the intersection of Sparks Rd and the I-90 Exit 70 in Easton, WA. It is in SE ¼ of the SW ¼ of Section 2, Township 20 North, Range 13 East W.M. The project site is 16.51 acres and is currently described as natural woods. See Vicinity Map below.

The purpose of this project is to design a road to serve as an initial access into the site from Sparks Rd with minimal change to the existing topography and site. Ultimately, a more complete build out of the site will take place, however this drainage report is only in relation to the initial access road, and when more development occurs, a new drainage analysis will need to be conducted. The proposed site will consist of a paved road coming down off of Sparks Rd into the site to tie into the natural grade. This road will extend off of Sparks Rd at the current "T" intersection with the I-90, Exit 70 on and off ramps.



VICINITY MAP
SCALE: 1"=1,000'

II. EXISTING CONDITIONS

The site is currently a large, naturally treed and vegetated area with a few rough, unmaintained, gravel roads through the site. The overall topography of the site gently slopes to the south. The flow generally gathers in the southwest section of the site, where runoff then meets the fill slope from Sparks road and subsequently runs northeast or southwest off the site. The site has a high permeability so infiltration plays a large role at the site as well. Runoff leaves the site in three concentrated places: in a drainage swale in the northwest corner of the site, through a culvert in the southwest end of the site, and through a culvert leaving the western edge of the site. Existing conditions can be seen in Appendix A, Exhibit A.

a. Drainage Basin

For the purpose of this report, the site is considered to be a single drainage basin. An existing culvert, leaves the site along its western border, draining the majority of the site. The existing drainage basin contains no impervious surfaces, meaning the entire 16.51 acres is wooded and pervious.

b. Downstream Analysis

A detailed downstream analysis was conducted for the Sparks Road site and can be seen in Appendix A. Runoff generally leaves the site to the west, through a series of culverts and swales. The runoff ultimately flows towards Lake Easton, and, although a few of the culverts should be cleared of any existing debris, there are no major blockages or drainage issues along the way.

c. Soil Report

An NRCS Web Soil Survey was performed for the site in order to obtain onsite soil types. The results of the report give descriptions of the soils found in the project area and the corresponding hydrologic soil groups. The results can be seen in Appendix A of the Downstream Analysis (Appendix A). The site is composed entirely of Kladnick, ashy sandy loam with 0 to 3% slopes. This soil type belongs to Hydrologic Soil Group A, meaning it is well drained and has a high infiltration rate.

III. PROPOSED CONDITIONS

The proposed development for this site consists of grading and paving an access road off of Sparks Rd. The site remains undisturbed, aside from the earthwork necessary to design the road. The paved road will be the new impervious surface added to the site. The fill slopes from the proposed road will be modelled as newly graded areas.

a. Drainage Basin

The only grading and ground disturbance resulting from this project will be in relation to the proposed access road. Aside from the access road, the drainage basin will remain relatively undisturbed, with similar drainage patterns. Proposed conditions can be seen in Figure 1.

IV. HYDROLOGIC MODELING- SANTA BARBARA URBAN HYDROGRAPH METHOD

Hydrologic analysis for the proposed project is consistent with Title 12 of the Kittitas County Code and the 2004 *SWMMEW*. In order to properly analyze the impacts of the proposed development on the watershed, runoff modeling was done using the Soil Conservation Service (SCS) hydrograph method, using the regional storm distribution for Region 1 per the 2004 *SWMMEW*. This was done to determine peak runoff during the 2-year and 25-year storm events. Calculations were performed utilizing HydroCAD version 10.00-18, which is accepted by the Department of Ecology as a proper simulation modeling program.

a. Precipitation

The precipitation information used for the pre-development and post-development run-off calculations is based on the isopluvial maps provided in the 2004 *SWMMEW* and can be seen in Appendix B. The inputs for this project site in Easton, WA are seen below:

P_{2yr} = 3.5”

P_{25yr} = 5.0”

b. Curve Number

The SCS Curve Number (CN) is a function of the soil type and ground cover. It is used to determine the portion of the precipitation depth that will be conveyed as runoff. The curve numbers are pulled from *Technical Release 55 Urban Hydrology for Small Watersheds*, and the curve numbers used can be seen in Table 1.

Table 1: Curve Numbers Used

DESCRIPTION	HYDROLOGIC SOIL GROUP	EXISTING DRAINAGE BASIN	PROPOSED DRAINAGE BASIN
	A	ACRES	ACRES
Woods-fair	36	16.51	15.65
Paved Road	98	0	0.28
Newly graded areas	77	0	0.58

Using the soils report and the curve number table, a composite curve number was determined for the proposed and existing basins. A detailed curve number breakdown and composite curve number calculations can be seen in Appendix C and D as part of the HydroCAD report.

c. Time of Concentration

Time of concentration is the time it takes for the runoff to get from the most hydrologically distant location to the point of collection for the basin. The flow path is broken up into three segments, with the hydrologic travel time calculated separate for each segment.

- Sheet flow- flow over plane surfaces which usually occurs at the headwaters of a catchment area. The maximum allowable length for sheet flow is 300-ft
- Shallow concentrated flow-flow in headwater areas where flow begins to concentrate in small rills or rough channels
- Channel flow- flow that is concentrated in defined channels

The time of concentration is the total of the travel times for each flow segment. Time of concentration calculations can be seen in Appendix C and D as part of the HydroCAD report.

d. Flow Calculations

HydroCAD uses all of the inputs described above in order to determine the peak flows for various storm events. All the inputs are combined to create unit hydrographs for each rainfall burst, which are summed together to create a final runoff hydrograph. The runoff hydrograph can be found in Appendix C and D as part of the HydroCAD report. The peak runoff values for the 2 and 25-year storms can be seen below in Table 2.

Table 2: Flow Computations

Q (cfs)		
Time Span	**2-yr**	**25-yr**
Existing Basin	**0.00**	**0.18**
Proposed Basin	**0.01**	**0.24**

V. HYDROLOGIC ANALYSIS

As seen in the calculated peak flow rates, the increased runoff due to proposed site development is minimal. The 2-yr peak flow is increased by 0.01 cfs and the 25-yr peak flow is increased by 0.06 cfs. Typically, *SWMMEW* requires developments to release runoff at or below one half of the existing 2-yr peak flow and at or below the existing 25-yr peak flow, as well as for that runoff to be treated.

Per Chapter 2.2.6 of the *SWMMEW* there are exemptions for new development when flow control is not required as long as certain conditions are met. Per chapter 2.2.6 exemption 1, "Any project able to disperse, without discharging to surface waters, the total 25-year runoff volume for the proposed development condition" is exempt from meeting the flow control requirements. The Sparks Rd project will use full dispersion as the best management practice (BMP) to mitigate increased flows due to impervious areas. As outlined in *SWMMEW* Chapter 6.5, BMP F6.42, full dispersion allows up to 10% of the site that is impervious to be characterized as non-effective impervious area by dispersing runoff into the native vegetation area. On the project site, the impervious areas may conservatively make up to 1.7% of the site while the rest of the site maintains existing vegetation. This is under the 10% threshold, making full dispersion a viable option.

Chapter 2.2.5 of the *SWMMEW* summarizes the requirements for treating storm water runoff to reduce pollutant loads and concentrations. Runoff treatment is required for all projects creating 5,000 sq ft or more of pollutant-generating impervious surfaces (PGIS). The Sparks Road project is not classified as a high use site; however, the proposed pavement area is greater than the 5,000 sq ft threshold. Runoff from the paved road will flow off of the road fill slopes and through natural, undisturbed vegetation. As full dispersion is used for flow control, it also used for runoff treatment. The ratio of impervious area to native vegetation area is less than 15%, and the site meets runoff treatment requirements by dispersing runoff into the preserved, native vegetation areas.

VI. COMPLIANCE WITH *SWMMEW* CORE ELEMENTS

All new development projects must comply with the 8 Core Elements outlined in Chapter 2 in the *SWMMEW* when applicable. Exemptions exist for each Core Element and vary depending on

requirements that must be met. The Core Elements are listed below in relation to the proposed development of the Sparks Rd Project, and exemptions are noted when applicable.

1. Preparation of a Stormwater Site Plan:
    - This can be seen in Figure 1- Proposed Drainage Basin Map, and will be included in the civil plans.
2. Construction Stormwater Pollution Prevention:
    - This will be included as part of the SWPPP submittal.
3. Source Control Pollution
    - There are no point source pollutants on the site.
4. Preservation of Natural Drainage Systems
    - Only the necessary grading for the access road will take place and natural drainage patterns will be maintained.
5. Runoff Treatment
    - The impervious to native vegetation area ratio is less than 15% and native vegetation will be maintained to the maximum extent possible. Due to this, full dispersion will be used as the runoff treatment method.
6. Flow Control
    - Per Exemption 1 in chapter 2.2.6 of *SWMMEW*, the site will use full dispersion to control the 2 and 25-yr flows.
7. Operation and Maintenance
    - No on-site maintenance is required for full dispersion.
8. Local Requirements
    - There are no local ordinances above and beyond what is outlined in *SWMMEW.*

VII. CONCLUSION

The Sparks Road Project involves designing a short road to serve as access on a 16.51-acre site that is naturally vegetated and treed. A majority of the site will remain undisturbed and existing topography and vegetation will be preserved to the maximum extent possible. From a stormwater and drainage standpoint, the biggest impact of the project will be creating 0.28 acres of an impervious, paved road. All site and location factors were taken into account in order to perform the SCS hydrograph method. The calculations from the modelling showed that the runoff generated from the 2-yr storm increased from 0.00 cfs to 0.01 cfs, while the runoff generated from the 25-yr storm increased from 0.18 cfs to 0.24 cfs. This increased runoff can be handled by full dispersion throughout the site, due to maintaining a majority of the existing vegetated area with minimal grading. Full dispersion is adequate for the proposed work associated for this project. However, if further buildout of the site occurs in the future, a new drainage analysis will need to be completed with an accompanying storm drain design in order to remain in compliance with Kittitas County Code and DOE's *SWMMEW*.

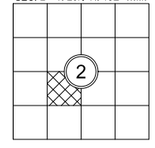
SPARKS ROAD

PTN. OF SE 1/4 OF SW 1/4 OF SECTION 2, T.20 N., R. 13 E., W.M.
KITTITAS COUNTY, STATE OF WASHINGTON

0 60 120
SCALE: 1" = 60'

Know what's below. Call before you dig.

INDEX LOCATION
SEC. 2 T. 20N R. 13E W.M.



KITTITAS COUNTY
APPROVED FOR CONSTRUCTION

COUNTY ENGINEER _____ DATE _____

REVISIONS			
DESCRIPTION	BY	DATE	

THEO MICHOLLIS — STATE OF WASHINGTON — 46995 — REGISTERED PROFESSIONAL ENGINEER

PLAN REVISION

xx/xx/xx

SPARKS ROAD
NATHAN WEIS
PROPOSED DRAINAGE CONDITIONS EXHIBIT

Encompass ENGINEERING & SURVEYING
165 NE Juniper Street, Suite 201 • Issaquah, WA 98027 • Phone: (425) 392-0250 • Fax: (425) 391-3055
Western Washington Division
407 Sunwater Blvd. • Ste. Elum, WA 98922 • Phone: (509) 674-7433 • Fax: (509) 674-7419
Eastern Washington Division

JOB NO.	17174
DATE	OCT. 2017
SCALE	1" = 60'
DESIGNED	SF
DRAWN	SF
CHECKED	TML\MKK
APPROVED	TML
SHEET	FIG-2

J:\17\17174\ENGINEERING\SD\Proposed Grading and Drainage Conditions.dwg 11/16/2017 4:35:29 PM

Appendix A:

DOWNSTREAM ANALYSIS

SPARKS ROAD
LEVEL 1 DOWNSTREAM ANALYSIS

October 16, 2017

Prepared by:
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List of Exhibits and Appendices

I. Project Overview

The purpose of this downstream analysis is to identify and evaluate and potential offsite water and runoff issues for the Sparks Road Project, and if any issues exist, to determine the proper ways to mitigate those issues. The project is located on Sparks Road, at the intersection with the I-90 Exit 70 in Easton, WA. Specifically, Kittitas County tax parcel number 778834, Map number 20-13-02030-0009. More generally, the project is located in the W ½ of the NW ¼ of Section 27, Township 20 North, Range 15 East W.M. See Vicinity Map below. The project will consist of an access road into the site to serve future development and an initial storm drain system to effectively convey flow through the site and discharge at or below existing conditions.

VICINITY MAP
SCALE: 1"=1,000'

II. Study Area

In order to properly perform a downstream analysis, the site location, as well as the area immediately upstream of the site, and the downstream flow path for at least ¼ mile, have been analyzed. The site generally drains to the southwest where the runoff is concentrated in an un-defined swale that flows to the southeast. Exhibit A, Study Area Map, shows the project drainage basin, the surrounding area, and the general downstream flow paths. The project site is approximately 16.1 acres. There is minimal offsite run on, because the site in a localized high spot. The flow leaves the project site in three different locations: in a drainage swale to the northwest, through an existing culvert to the west, and in a drainage swale to the southeast. All of these drainage paths follow series of culverts and swales, described in section III.c. of this report, towards Lake Easton.

III. Existing Drainage Conditions

In order to perform a complete downstream analysis, the existing drainage conditions were thoroughly analyzed. Information of the existing conditions has been gathered through all available data pertaining to the study area and through a field inspection. All drainage features were then documented and analyzed, and any associated drainage problems were noted and assessed.

a. Research

Research for this site included reviewing FEMA maps, reviewing a soil map of the area, and analyzing an existing topographic survey of the area.

A review of FEMA maps shows that project site is entirely out of the 100-yr floodplain. The downstream flow path remains out of the 100-yr floodplain until the flow enters Lake Easton.

An NRCS Web Soil Survey was performed for the site in order to obtain a soil report. The results give a description of the soils found in the project area and the corresponding hydrologic soil groups. The entire project site is made up of Kladnick ashy sandy loam. This soil belongs to the hydrologic soil group A, which has a high infiltration rate and low runoff potential, even when thoroughly wet. This means there is a high rate of downward water movement through the soil and therefore infiltration plays a large role on the site. See Appendix A for the complete Soil Report.

The topographic survey of the site shows that the site is generally well drained in its current state. There are no major low spots or ponding locations, and there are multiple points where drainage leaves the site.

b. Field Inspection

A physical field inspection was conducted on the study area in order to analyze both the onsite and offsite drainage systems and to identify any existing or potential problem areas in the drainage path. The field inspection took place on the morning of October 6, 2017. It was a sunny and clear morning. The study area falls within a rural area which is comprised of natural vegetation with a few rural residential structures nearby. Throughout the field inspection, emphasis was placed on locating areas of constrictions/overcapacity, flooding, overtopping, erosion, impact on aquatic habitat, and any other visible drainage-related problems. The most noticeable issues along the drainage paths are partially obstructed culvert entrances and exits due to debris. This will be discussed further in Sections III.c. & d. Photos from the field inspection can be seen in Appendix B.

c. Drainage Description

All drainage features were documented during the field inspection. The eastern and northern borders of the site are local high points that act as barriers preventing offsite flows from entering the site. The southwest border of the site is marked by a raised road bed that slopes away from the project site. There is a steep slope from the road down to the project site, however due to the slope of the road, all road runoff drains away from the site. The site is a localized high point and in combination with the described boundary conditions, there is minimal to zero offsite run on to be accounted for in this analysis.

The project site consists of a large, naturally treed and vegetated area. There are a few rough, gravel roads through the site that appear to be user created. As a whole, the site generally slopes towards the southwest where runoff would run up against the fill slope from Sparks Rd. A small portion of this runoff flows to the northwest and leaves the site at the northwest corner of the lot. This is referred to as Collection Point 1(CP1). The majority of the runoff flows southeast along the southwest border. A portion of this flow leaves the site through an existing culvert that intercepts stormwater and diverts it under Sparks Rd. This is Collection Point 2(CP2). The flow that does not get intercepted by the culvert, continues flowing southeast and is met by runoff from the southern portion of the site. This flow all leaves the site at Collection Point 3 (CP3) where it enters an existing culvert at the southern end of the site to be diverted under a road. Flows patterns from the site and surrounding area are illustrated in Exhibit A.

From each collection point, the drainage flow path has been analyzed and all drainage features have been documented in the Offsite Drainage Systems Analysis Table, Exhibit B, and displayed on Exhibit A.

CP1 is where flow leaves the site at the northwest corner of the project. At this point, the flow follows an existing gravel swale to the northwest along Sparks Rd.

The swale is then intersected with an 18" corrugate metal pipe (CMP) that diverts part of the flow to the southwest, under Sparks Rd. The flow that doesn't enter this culvert, continues north in the gravel swale along Sparks Rd. It enters an 18" CMP to cross under a driveway and then continues along the gravel swale. The flow that is captured by the first 18" CMP is outletted into a grass lined swale, where it travels for a short distance before entering another 18" CMP that conveys the flow under the I-90 on ramp. The water exits the culvert and soon flows into a grate inlet, entering a storm drain to pass underneath I-90, towards Lake Easton.

CP2 is located midway along the site's southwestern border, see Exhibit A. There is an existing 24" CMP at this point that diverts water from the site to the southwest under Sparks Rd. This culvert outlets to a relatively flat, shrubbed area with no distinct channel. It gently slopes to the west, where the runoff enters a 24" CMP and travels under the I-90 off ramp. After exiting the culvert, it continues traveling west before entering a 15" concrete culvert that conveys the stormwater underneath I-90, towards Lake Easton.

CP3 marks the southeast corner of the project site. It sits at the end of the gravel channel that runs southeast along the southwestern border. The flow leaving the site at CP3 passes through at 15" CMP underneath a gravel road. The flow follows Sparks Rd to the south through a gravel ditch, towards another 15" CMP. Upon exiting the CMP, the flow continues south in a gravel roadside ditch, before entering an 18" CMP that crosses under Sparks Rd to the West. The runoff then follows a gravel roadside ditch on the west side of Sparks Rd. It travels south before ultimately entering a culvert to cross under I-90, towards Lake Easton.

For a more detailed description of the drainage features and related observations see Exhibit B. Corresponding photos can be seen in Appendix B. Due to the high permeability of the soils on the site, as determined by the NRCS webs soil survey, it is important to note that a large portion of the stormwater will permeate into the ground, and therefore it will not impact downstream flow paths.

d. Potential and Predicted Problems

An analysis of the runoff path has determined that there a few minor problems with drainage features along the existing flow path. The culverts under Sparks Rd at CP2 and downstream of CP3 (Exhibit B, Features G and O) have the greatest obstructions at the entrances and exits. See Appendix B, Figures 6 and 12 for photos. Although this does not pose a large issue, it is recommended to clear any debris in and around the culvert when the project occurs. All swales and roadside ditches are in working condition and sufficiently sized to convey runoff. No erosion or sloughing was noted. The culverts along the flow paths appeared adequately sized to handle the runoff, as there were no signs of previous overtopping. Although there is some debris buildup at the entrances and exits of a few culverts, it is not enough to significantly impede the flow of water. The

project site will be developed in a way that will produce runoff at or below existing values, therefore no potential problems are foreseen.

IV. Conclusion

A level 1 downstream analysis of the proposed development of the Sparks Rd project within Kittitas County has been conducted, and no major issues were discovered. The project will not add significant runoff to the existing drainage system. The drainage system was analyzed and researched; It is not known to be a drainage area of concern. A field inspection revealed that there is an adequate storm drain system in place to handle runoff that enters the system. Minor cleanup along culvert entrances and exits would be beneficial to the flow path, however all drainage features sufficiently convey runoff as needed.

B. 18-IN CMP UNDER DRIVEWAY

A. GRAVEL SWALE

CP 1

FOUND PIN & CAP

C. 18" CMP UNDER SPARKS RD

D. GRASS LINED SWALE

E. 18" CMP UNDER ON-RAMP

F. GRATE INLET PRIOR TO I-90

OLD GROWTH TREES MARK BORDER OF PROPERTY, RUNOFF FLOWS WEST PARALLEL TO BOUNDARY LINE

EXISTING GRAVEL PATH THAT ACTS AS A DRAINAGE SWALE

SCALE: 1" = 40'

GUARD RAIL

UGE

VAULT

FR LINE

TURN BACK LINE

WD LINE

WX LINE

WC LINE

SIGN

WX 1"25.00 P.O.T.
WC 11"25.00 P.O.T.
WD 001600.00 P.O.T.

WX 0100.18 P.O.T.
FR 14"60.9 P.O.C.

SLASH PILE

TREE LINE

EDGE OF ASPHALT

FOUND PIN & CAP

O/H TELEPHONE

FOUND DNR MONUMENT

GATE

FENCE

POST

O/H POWER & TELEPHONE

ROAD

MATCH LINE SHEET 1 / SHEET 2

MATCH LINE SHEET 1 / SHEET 2

EXHIBIT A1
STUDY AREA MAP
SPARKS ROAD DOWNSTREAM ANALYSIS

EXIT 70 TRUCK STOP
TOPOGRAPHIC SURVEY

Part of the SE 1/4 of the SW 1/4,
Section 2, T. 20 N., R. 13 E., W.M.
Kittitas County, Washington

CRUSE & NELSON
PROFESSIONAL LAND SURVEYORS
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Ellensburg, WA 98926
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Ph. (509) 925-4747

SU.1

SCALE: 1" = 40'

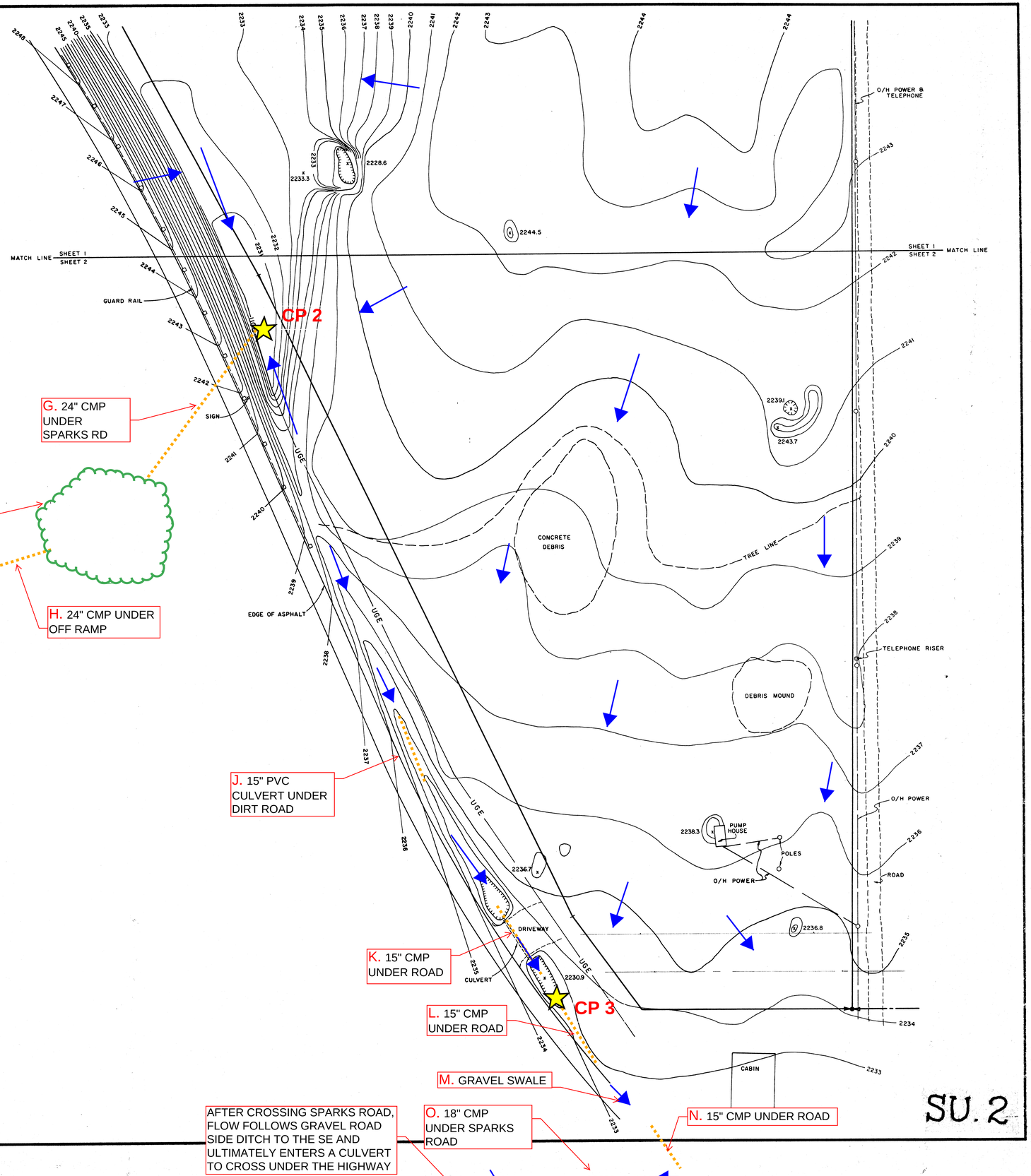

EXHIBIT A2
STUDY AREA MAP
SPARKS ROAD DOWNSTREAM ANALYSIS

EXIT 70 TRUCK STOP
TOPOGRAPHIC SURVEY

Part of the SE 1/4 of the SW 1/4,
Section 2, T. 20 N., R. 13 E., W.M.
Kittitas County, Washington

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SHEET 2 OF 2

SU.2

Sparks Road Downstream Analysis
Encompass Engineering and Surveying

Exhibit B.

OFF-SITE ANALYSIS DRAINAGE SYSTEM TABLE
SURFACE WATER DESIGN MANUAL, CORE REQUIREMENT #2

Stimac Property Downstream Analysis

Feature	Drainage, Component Type, Name and Size	Drainage Component Description	Related Collection Point	Distance from site discharge	Existing Problems/Potential Problems	Oberservations of field inspector, resource reviewer, or resident
see map	Type: Sheet flow, swale, stream, channel, pipe, pond: Size: diameter, surface area	Dranage basin, vegetation, cover, depth, type of sensitive area, volume	CP	1/4 ml = 1,320 ft.	Constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion	Tributary area, likelihood of problem overflow pathways, potential impacts
A	**Existing Gravel Swale, 2 ft wide bottom, 3 ft deep 3:1 side slopes**	**relatively maintained**	**CP1**	**immediately downstream**	**None**	**Along Sparks Rd, adequately sized**
B	**18" CMP**	**1-2 ft of cover, approx. 40 ft long**	**CP1**	**250 ft downstream**	**None**	**Conveys flow under a private driveway, to allow the Existing Gravel Swale along Sparks Rd (A) to continue**
C	**18" CMP**	**2-3 ft of cover, approx. 50 ft long**	**CP1**	**100 ft downstream**	**Gravel buildup in pipes and near entrance/exit.**	**Conveys flow under Sparks Rd**
D	**Grass Lined Swale, 2 ft wide bottom, 2 ft deep, 2:1 side slopes**	**Heavily vegetated with distinct channel**	**CP1**	**150 ft downstream**	**None**	**Swale is through heavily vegetated, unmaintend strip of land between interstate on ramp and Sparks Rd**
E	**18" CMP**	**2-3 ft cover, approx. 55 ft long**	**CP1**	**260 ft downstream**	**Minor sediment buildup in entrance and exit**	**Conveys flow under the I-90 on ramp**
F	**Grate Inlet**	**approx. 3 ft x 10 ft**	**CP1**	**390 ft downstream**	**Small potential for debris to clog inlet**	**Conveys flow under I-90, towards Lake Easton**
G	**24" CMP**	**approx. 10 ft of cover, 100 ft long**	**CP2**	**Immediately Downstream**	**Pipe inlet is relatively obscured with debris buildup, and is partially squashed**	**Conveys flow from middle of site under Sparks Rd**
H	**24" CMP**	**Approx 2-3 ft cover, 65 ft long**	**CP2**	**450 ft downstream**	**None**	**Conveys flow under I-90 off ramp**
I	**15" Concrete Culvert**	**Concrete pipe within a CMP**	**CP2**	**525 ft downstream**	**Potential for minor debris buildup at pipe inlet**	**Conveys flow under I-90 towards Lake Easton**
J	**15" PVC Culvert**	**1-2 ft cover, 40 ft long**	**CP3**	**200 ft upstream**	**None**	**Conveys flow under a primitive driveway onsite**
K	**15" CMP**	**1-2 ft cover, 70 ft long**	**CP3**	**Immediately downstream**	**minor debris buildup in pipe entrance and exit**	**Conveys flow under paved driveway**
L	**15" CMP**	**1-2 ft cover, 50 ft**	**CP3**	**100 ft downstream**	**minor debris buildup in pipe entrance and exit**	**conveys flow under private driveway**
M	**Gravel Swale, 2 ft wide bottom, 3 ft deep, 3:1 side slopes**	**relatively maintained with some vegetation**	**CP3**	**75 ft downstream**	**None**	**Swale is along east side of Sparks road, connected by culverts that allow drainage to pass under existing driveways and continue south in swale**
N	**15" CMP**	**1-3 ft cover, 75 ft long**	**CP3**	**250 ft downstream**	**minor debris buildup in pipe entrance and exit**	**Conveys flow under driveway to Silver Ridge Ranch**
O	**18" CMP**	**2-3 ft of cover,50 ft long**	**CP3**	**450 ft downstream**	**debris buildup at pipe entrance and pipe is partially squashed**	**Conveys flow under Sparks Rd to a roadside gravel ditch on the west side of the road**

Map Scale: 1:2,470 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kittitas County Area, Washington
Survey Area Data: Version 9, Sep 9, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 5, 2014—Aug 28, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
237	Kladnick ashy sandy loam, 0 to 3 percent slopes	A	15.0	100.0%
Totals for Area of Interest			**15.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B

FIELD INSPECTION PHOTOS

Date: *6 October 2017*

Sparks Road Project Downstream Analysis

Encompass Engineering and Surveying

Figure 1: Project Site

Figure 2: Feature A- Gravel swale, looking northwest from site

Figure 3: Feature C- 18” CMP entrance

Figure 4: Feature F- Grate inlet prior to I-90

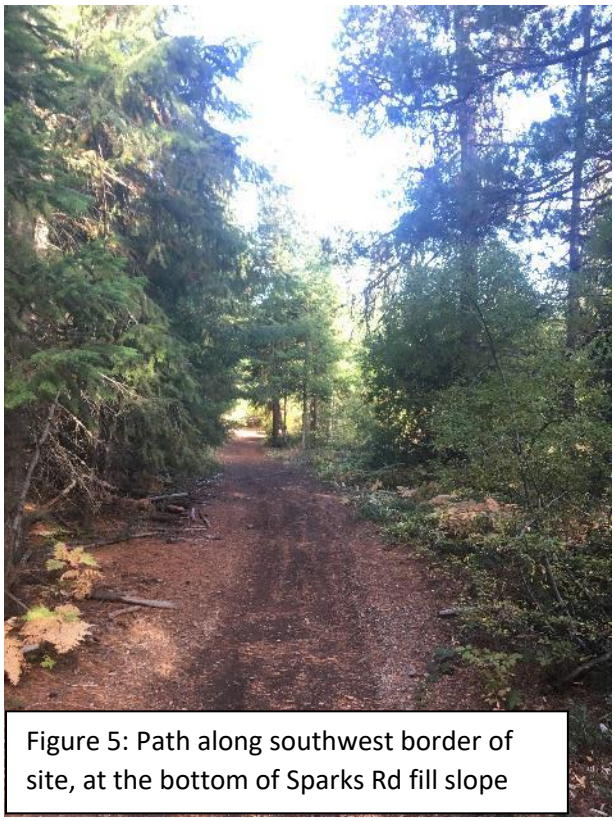


Figure 5: Path along southwest border of site, at the bottom of Sparks Rd fill slope

Figure 6: Feature G- 24” CMP entrance

Figure 7: Feature H- 24” CMP entrance

Figure 8: Feature I- 15” Concrete culvert entrance

Figure 9: Feature J- 15” PVC culvert entrance

Figure 10: Feature L- 15” CMP entrance

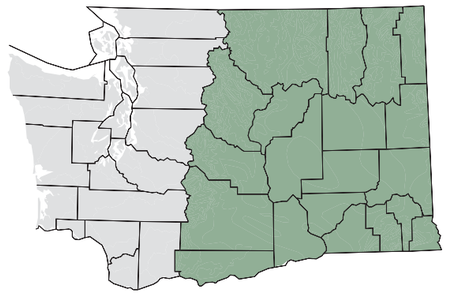
Figure 11: Feature M- Gravel Swale, looking southeast along Sparks Rd

Figure 12: Feature O- 18” CMP entrance

Appendix B:

SWMMEW ISOPLUVIAL MAPS

Eastern Washington Stormwater Manual



2-Year 24-Hour Isopluvials

Source: NOAA Atlas 2, Volume IX, 1973

Precipitation in inches

Sparks Road Project Site Location
P(2-yr)= 3.5"

OKANOGAN
PEND OREILLE
STEVENS
FERRY
CHELAN
DOUGLAS
LINCOLN
SPOKANE
KITTITAS
GRANT
ADAMS
WHITMAN
FRANKLIN
GARFIELD
YAKIMA
BENTON
WALLA WALLA
COLUMBIA
ASOTIN
KLICKITAT

- County(2003, 1:24,000)
- City(2003, 1:24,000)
- Latitude/Longitude(1/10 degree)
- Isopluvial(1973, 1:2,000,000)
- NOAA/NWS Station(1931-1998)

Scale 1:1,600,000

Miles

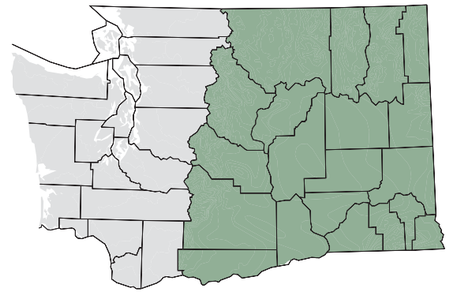
0 16.5 33

Water Quality Program

WASHINGTON STATE DEPARTMENT OF ECOLOGY

GIS Technical Services
02/25/04
Figure_4.3.3

Eastern Washington Stormwater Manual



25-Year 24-Hour Isopluvials

Source: NOAA Atlas 2, Volume IX, 1973

Precipitation in inches

Sparks Road Project Site Location
P(25-yr)= 5.0"

OKANOGAN
FERRY
PEND OREILLE
STEVENS
CHELAN
DOUGLAS
LINCOLN
SPOKANE
KITTITAS
GRANT
ADAMS
WHITMAN
FRANKLIN
GARFIELD
YAKIMA
BENTON
WALLA WALLA
COLUMBIA
ASOTIN
KLICKITAT

- County(2003, 1:24,000)
- City(2003, 1:24,000)
- Latitude/Longitude(1/10 degree)
- Isopluvial(1973, 1:2,000,000)
- NOAA/NWS Station(1931-1998)

N

Scale 1:1,600,000

Miles

0 16.5 33

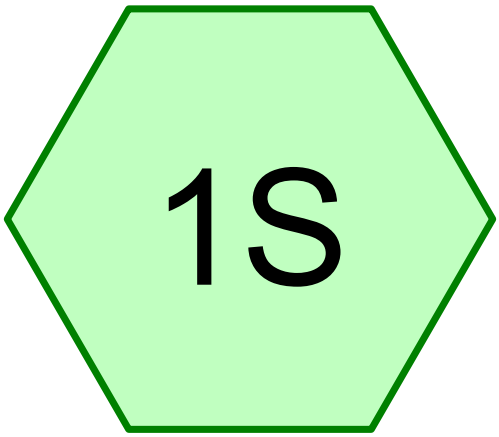
Water Quality Program

WASHINGTON STATE DEPARTMENT OF ECOLOGY

GIS Technical Services
02/25/04
Figure_4.3.5

Appendix C:

HydroCAD REPORT:
EXISTING BASIN



Existing Conditions

Subcat Reach Pond Link

Routing Diagram for 17174 HydroCAD
Prepared by Encompass Engineering and Surveying, Printed 11/16/2017

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.510	36	Woods- fair (HSG A) (1S)
16.510	**36**	**TOTAL AREA**

Summary for Subcatchment 1S: Existing Conditions

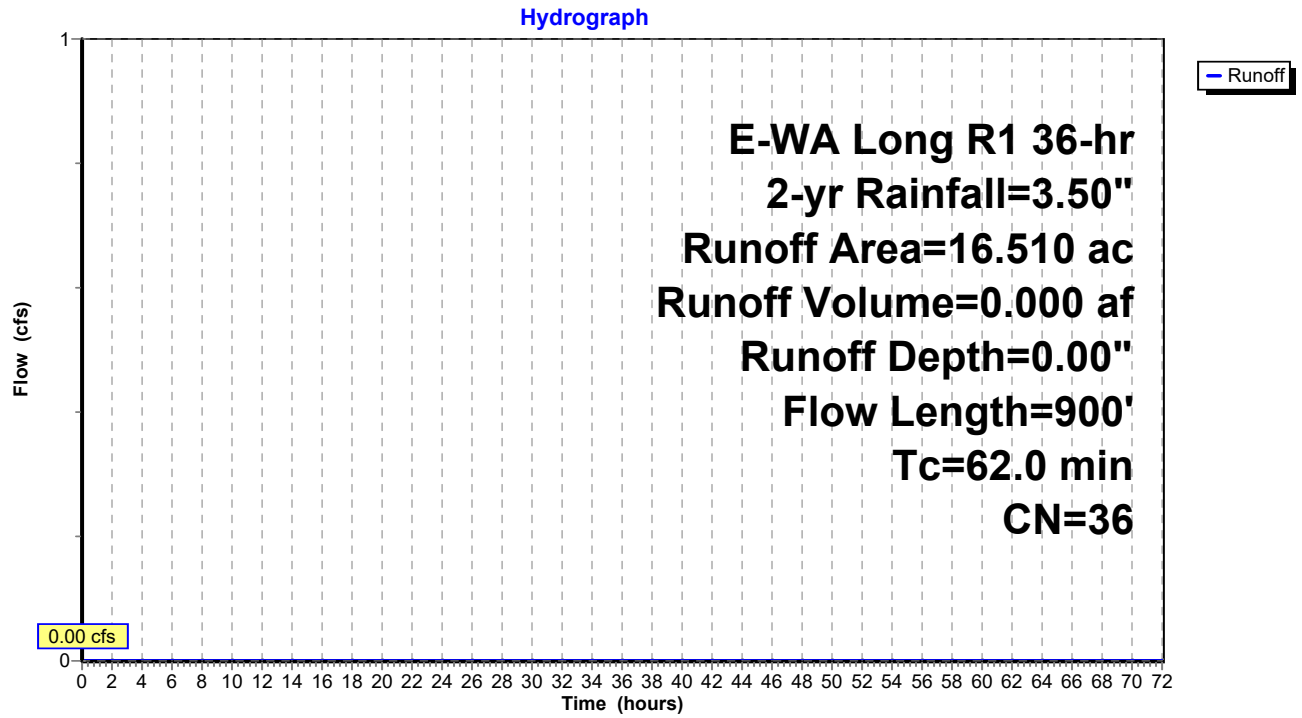
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
E-WA Long R1 36-hr 2-yr Rainfall=3.50"

	Area (ac)	CN	Description
*	16.510	36	Woods- fair (HSG A)
	16.510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0	300	0.0300	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
20.0	600	0.0100	0.50		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
62.0	900	Total			

Subcatchment 1S: Existing Conditions



Hydrograph for Subcatchment 1S: Existing Conditions

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	**0.00**	**0.00**	52.00	3.50	0.00	0.00
1.00	0.01	0.00	0.00	53.00	3.50	0.00	0.00
2.00	0.04	0.00	0.00	54.00	3.50	0.00	0.00
3.00	0.08	0.00	0.00	55.00	3.50	0.00	0.00
4.00	0.12	0.00	0.00	56.00	3.50	0.00	0.00
5.00	0.17	0.00	0.00	57.00	3.50	0.00	0.00
6.00	0.24	0.00	0.00	58.00	3.50	0.00	0.00
7.00	0.33	0.00	0.00	59.00	3.50	0.00	0.00
8.00	0.44	0.00	0.00	60.00	3.50	0.00	0.00
9.00	0.56	0.00	0.00	61.00	3.50	0.00	0.00
10.00	0.69	0.00	0.00	62.00	3.50	0.00	0.00
11.00	0.83	0.00	0.00	63.00	3.50	0.00	0.00
12.00	0.98	0.00	0.00	64.00	3.50	0.00	0.00
13.00	1.14	0.00	0.00	65.00	3.50	0.00	0.00
14.00	1.32	0.00	0.00	66.00	3.50	0.00	0.00
15.00	1.58	0.00	0.00	67.00	3.50	0.00	0.00
16.00	1.82	0.00	0.00	68.00	3.50	0.00	0.00
17.00	2.00	0.00	0.00	69.00	3.50	0.00	0.00
18.00	2.15	0.00	0.00	70.00	3.50	0.00	0.00
19.00	2.27	0.00	0.00	71.00	3.50	0.00	0.00
20.00	2.38	0.00	0.00	72.00	3.50	0.00	0.00
21.00	2.49	0.00	0.00				
22.00	2.60	0.00	0.00				
23.00	2.69	0.00	0.00				
24.00	2.79	0.00	0.00				
25.00	2.88	0.00	0.00				
26.00	2.96	0.00	0.00				
27.00	3.04	0.00	0.00				
28.00	3.12	0.00	0.00				
29.00	3.19	0.00	0.00				
30.00	3.26	0.00	0.00				
31.00	3.32	0.00	0.00				
32.00	3.37	0.00	0.00				
33.00	3.41	0.00	0.00				
34.00	3.45	0.00	0.00				
35.00	3.48	0.00	0.00				
36.00	**3.50**	0.00	0.00				
37.00	3.50	0.00	0.00				
38.00	3.50	0.00	0.00				
39.00	3.50	0.00	0.00				
40.00	3.50	0.00	0.00				
41.00	3.50	0.00	0.00				
42.00	3.50	0.00	0.00				
43.00	3.50	0.00	0.00				
44.00	3.50	0.00	0.00				
45.00	3.50	0.00	0.00				
46.00	3.50	0.00	0.00				
47.00	3.50	0.00	0.00				
48.00	3.50	0.00	0.00				
49.00	3.50	0.00	0.00				
50.00	3.50	0.00	0.00				
51.00	3.50	0.00	0.00				

Summary for Subcatchment 1S: Existing Conditions

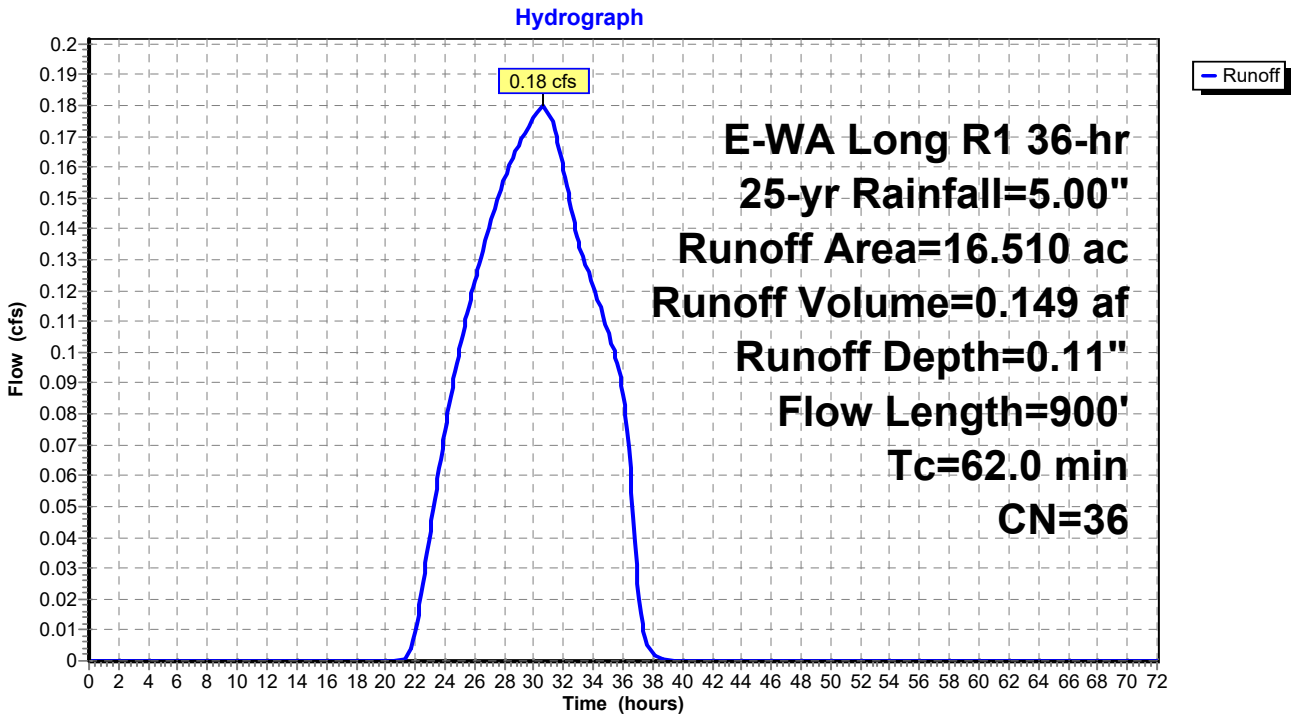
Runoff = 0.18 cfs @ 30.66 hrs, Volume= 0.149 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
E-WA Long R1 36-hr 25-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	16.510	36	Woods- fair (HSG A)
	16.510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0	300	0.0300	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
20.0	600	0.0100	0.50		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
62.0	900	Total			

Subcatchment 1S: Existing Conditions

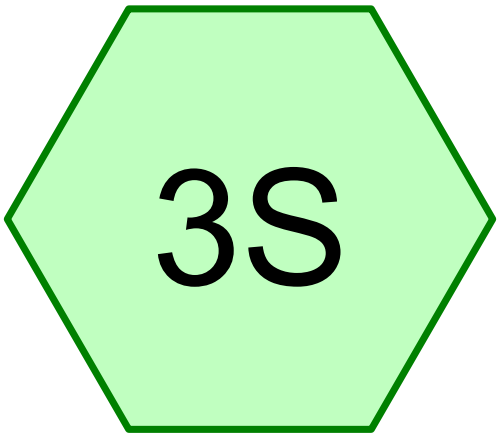


Hydrograph for Subcatchment 1S: Existing Conditions

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.02	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.17	0.00	0.00
5.00	0.24	0.00	0.00
6.00	0.34	0.00	0.00
7.00	0.47	0.00	0.00
8.00	0.63	0.00	0.00
9.00	0.80	0.00	0.00
10.00	0.99	0.00	0.00
11.00	1.19	0.00	0.00
12.00	1.40	0.00	0.00
13.00	1.63	0.00	0.00
14.00	1.88	0.00	0.00
15.00	2.25	0.00	0.00
16.00	2.61	0.00	0.00
17.00	2.86	0.00	0.00
18.00	3.07	0.00	0.00
19.00	3.25	0.00	0.00
20.00	3.41	0.00	0.00
21.00	3.56	0.00	0.00
22.00	3.71	0.00	0.01
23.00	3.85	0.00	0.04
24.00	3.98	0.01	0.07
25.00	4.11	0.02	0.10
26.00	4.23	0.02	0.12
27.00	4.35	0.03	0.14
28.00	4.46	0.04	0.16
29.00	4.56	0.05	0.17
30.00	4.66	0.06	**0.18**
31.00	4.75	0.07	**0.18**
32.00	4.82	0.08	0.16
33.00	4.88	0.09	0.14
34.00	4.93	0.10	0.12
35.00	4.97	0.10	0.11
36.00	**5.00**	**0.11**	0.09
37.00	5.00	0.11	0.03
38.00	5.00	0.11	0.00
39.00	5.00	0.11	0.00
40.00	5.00	0.11	0.00
41.00	5.00	0.11	0.00
42.00	5.00	0.11	0.00
43.00	5.00	0.11	0.00
44.00	5.00	0.11	0.00
45.00	5.00	0.11	0.00
46.00	5.00	0.11	0.00
47.00	5.00	0.11	0.00
48.00	5.00	0.11	0.00
49.00	5.00	0.11	0.00
50.00	5.00	0.11	0.00
51.00	5.00	0.11	0.00
52.00	5.00	0.11	0.00
53.00	5.00	0.11	0.00
54.00	5.00	0.11	0.00
55.00	5.00	0.11	0.00
56.00	5.00	0.11	0.00
57.00	5.00	0.11	0.00
58.00	5.00	0.11	0.00
59.00	5.00	0.11	0.00
60.00	5.00	0.11	0.00
61.00	5.00	0.11	0.00
62.00	5.00	0.11	0.00
63.00	5.00	0.11	0.00
64.00	5.00	0.11	0.00
65.00	5.00	0.11	0.00
66.00	5.00	0.11	0.00
67.00	5.00	0.11	0.00
68.00	5.00	0.11	0.00
69.00	5.00	0.11	0.00
70.00	5.00	0.11	0.00
71.00	5.00	0.11	0.00
72.00	5.00	0.11	0.00

Appendix D:

HydroCAD REPORT:
PROPOSED BASIN



Proposed Conditions

Subcat Reach Pond Link

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.580	77	Newly graded areas (HSG A) (3S)
0.280	98	Paved road (3S)
15.650	36	Woods- fair (HSG A) (3S)
16.510	**38**	**TOTAL AREA**

Summary for Subcatchment 3S: Proposed Conditions

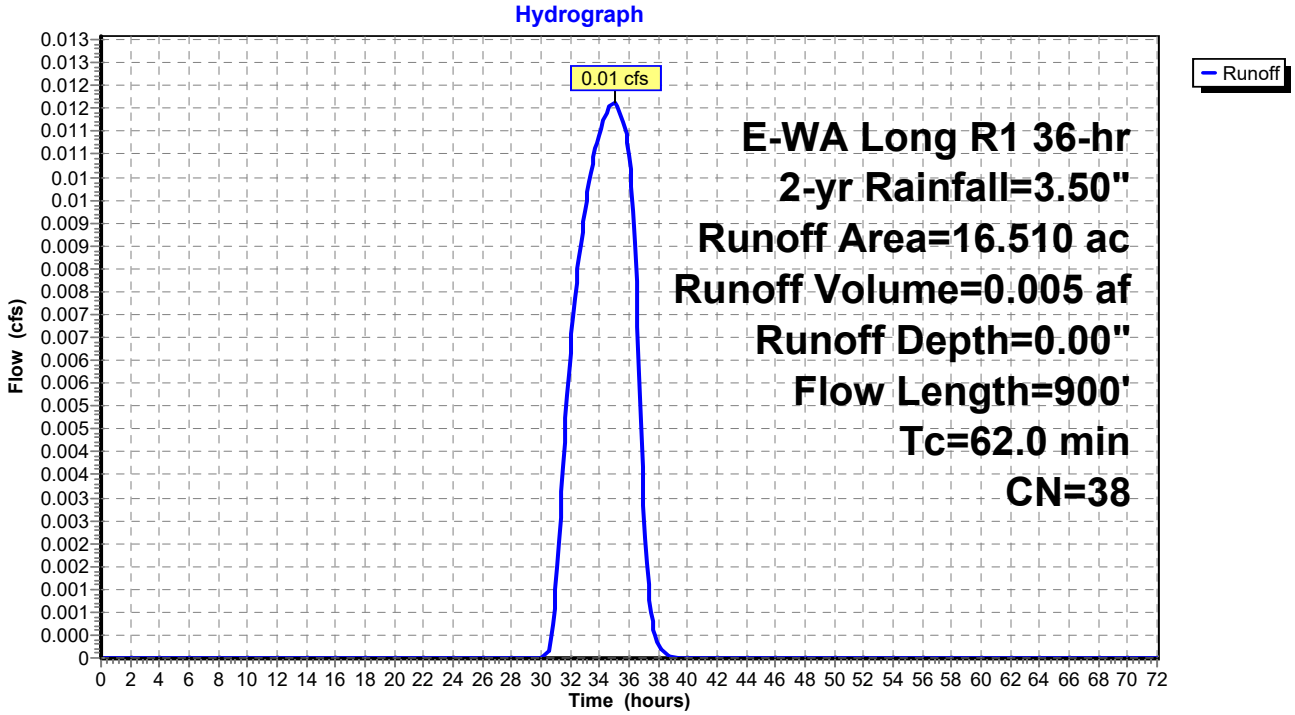
Runoff = 0.01 cfs @ 35.02 hrs, Volume= 0.005 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
E-WA Long R1 36-hr 2-yr Rainfall=3.50"

	Area (ac)	CN	Description
*	15.650	36	Woods- fair (HSG A)
*	0.280	98	Paved road
*	0.580	77	Newly graded areas (HSG A)
	16.510	38	Weighted Average
	16.230		98.30% Pervious Area
	0.280		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0	300	0.0300	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
20.0	600	0.0100	0.50		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
62.0	900	Total			

Subcatchment 3S: Proposed Conditions



Hydrograph for Subcatchment 3S: Proposed Conditions

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	52.00	3.50	0.00	0.00
1.00	0.01	0.00	0.00	53.00	3.50	0.00	0.00
2.00	0.04	0.00	0.00	54.00	3.50	0.00	0.00
3.00	0.08	0.00	0.00	55.00	3.50	0.00	0.00
4.00	0.12	0.00	0.00	56.00	3.50	0.00	0.00
5.00	0.17	0.00	0.00	57.00	3.50	0.00	0.00
6.00	0.24	0.00	0.00	58.00	3.50	0.00	0.00
7.00	0.33	0.00	0.00	59.00	3.50	0.00	0.00
8.00	0.44	0.00	0.00	60.00	3.50	0.00	0.00
9.00	0.56	0.00	0.00	61.00	3.50	0.00	0.00
10.00	0.69	0.00	0.00	62.00	3.50	0.00	0.00
11.00	0.83	0.00	0.00	63.00	3.50	0.00	0.00
12.00	0.98	0.00	0.00	64.00	3.50	0.00	0.00
13.00	1.14	0.00	0.00	65.00	3.50	0.00	0.00
14.00	1.32	0.00	0.00	66.00	3.50	0.00	0.00
15.00	1.58	0.00	0.00	67.00	3.50	0.00	0.00
16.00	1.82	0.00	0.00	68.00	3.50	0.00	0.00
17.00	2.00	0.00	0.00	69.00	3.50	0.00	0.00
18.00	2.15	0.00	0.00	70.00	3.50	0.00	0.00
19.00	2.27	0.00	0.00	71.00	3.50	0.00	0.00
20.00	2.38	0.00	0.00	72.00	3.50	0.00	0.00
21.00	2.49	0.00	0.00				
22.00	2.60	0.00	0.00				
23.00	2.69	0.00	0.00				
24.00	2.79	0.00	0.00				
25.00	2.88	0.00	0.00				
26.00	2.96	0.00	0.00				
27.00	3.04	0.00	0.00				
28.00	3.12	0.00	0.00				
29.00	3.19	0.00	0.00				
30.00	3.26	0.00	0.00				
31.00	3.32	0.00	0.00				
32.00	3.37	0.00	0.01				
33.00	3.41	0.00	0.01				
34.00	3.45	0.00	0.01				
35.00	3.48	0.00	**0.01**				
36.00	**3.50**	**0.00**	0.01				
37.00	3.50	0.00	0.00				
38.00	3.50	0.00	0.00				
39.00	3.50	0.00	0.00				
40.00	3.50	0.00	0.00				
41.00	3.50	0.00	0.00				
42.00	3.50	0.00	0.00				
43.00	3.50	0.00	0.00				
44.00	3.50	0.00	0.00				
45.00	3.50	0.00	0.00				
46.00	3.50	0.00	0.00				
47.00	3.50	0.00	0.00				
48.00	3.50	0.00	0.00				
49.00	3.50	0.00	0.00				
50.00	3.50	0.00	0.00				
51.00	3.50	0.00	0.00				

Summary for Subcatchment 3S: Proposed Conditions

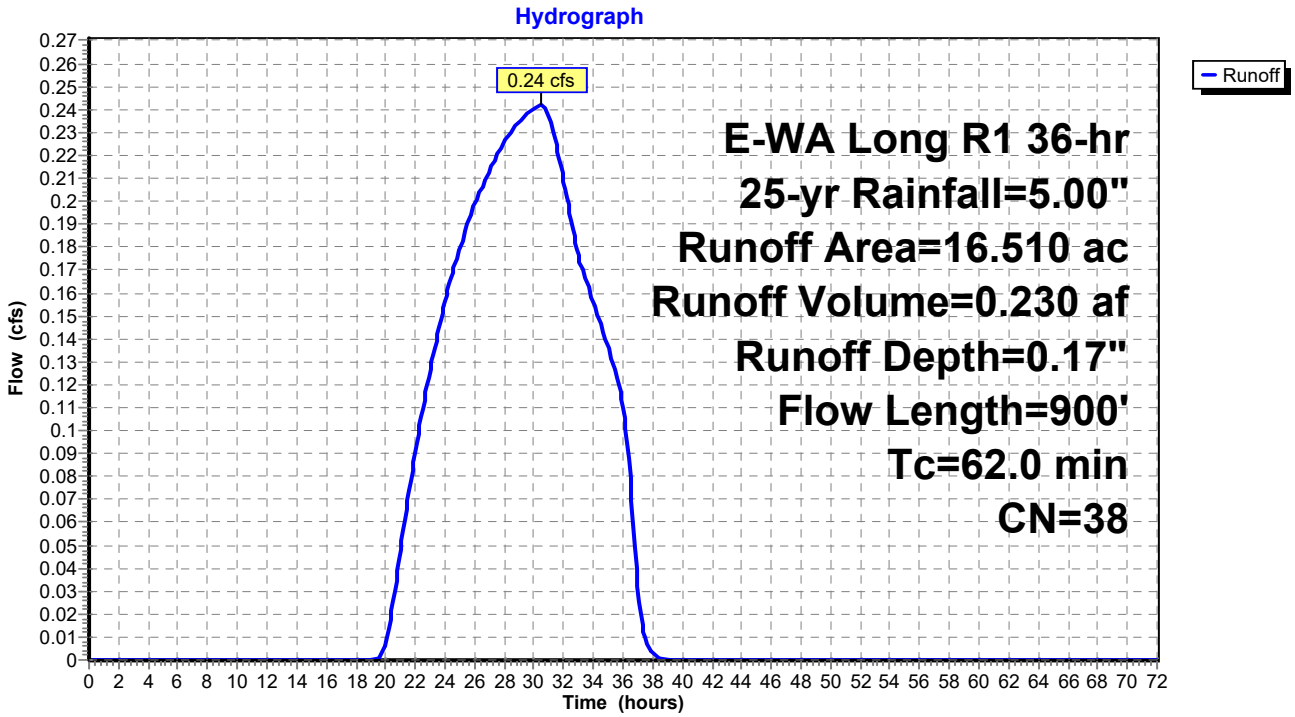
Runoff = 0.24 cfs @ 30.49 hrs, Volume= 0.230 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
E-WA Long R1 36-hr 25-yr Rainfall=5.00"

	Area (ac)	CN	Description
*	15.650	36	Woods- fair (HSG A)
*	0.280	98	Paved road
*	0.580	77	Newly graded areas (HSG A)
	16.510	38	Weighted Average
	16.230		98.30% Pervious Area
	0.280		1.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0	300	0.0300	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
20.0	600	0.0100	0.50		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
62.0	900	Total			

Subcatchment 3S: Proposed Conditions



Hydrograph for Subcatchment 3S: Proposed Conditions

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.02	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.17	0.00	0.00
5.00	0.24	0.00	0.00
6.00	0.34	0.00	0.00
7.00	0.47	0.00	0.00
8.00	0.63	0.00	0.00
9.00	0.80	0.00	0.00
10.00	0.99	0.00	0.00
11.00	1.19	0.00	0.00
12.00	1.40	0.00	0.00
13.00	1.63	0.00	0.00
14.00	1.88	0.00	0.00
15.00	2.25	0.00	0.00
16.00	2.61	0.00	0.00
17.00	2.86	0.00	0.00
18.00	3.07	0.00	0.00
19.00	3.25	0.00	0.00
20.00	3.41	0.00	0.01
21.00	3.56	0.01	0.05
22.00	3.71	0.01	0.09
23.00	3.85	0.02	0.13
24.00	3.98	0.03	0.16
25.00	4.11	0.04	0.18
26.00	4.23	0.05	0.20
27.00	4.35	0.07	0.21
28.00	4.46	0.08	0.23
29.00	4.56	0.10	0.23
30.00	4.66	0.11	**0.24**
31.00	4.75	0.12	**0.24**
32.00	4.82	0.14	0.21
33.00	4.88	0.15	0.18
34.00	4.93	0.15	0.16
35.00	4.97	0.16	0.14
36.00	**5.00**	**0.17**	0.11
37.00	5.00	0.17	0.03
38.00	5.00	0.17	0.00
39.00	5.00	0.17	0.00
40.00	5.00	0.17	0.00
41.00	5.00	0.17	0.00
42.00	5.00	0.17	0.00
43.00	5.00	0.17	0.00
44.00	5.00	0.17	0.00
45.00	5.00	0.17	0.00
46.00	5.00	0.17	0.00
47.00	5.00	0.17	0.00
48.00	5.00	0.17	0.00
49.00	5.00	0.17	0.00
50.00	5.00	0.17	0.00
51.00	5.00	0.17	0.00
52.00	5.00	0.17	0.00
53.00	5.00	0.17	0.00
54.00	5.00	0.17	0.00
55.00	5.00	0.17	0.00
56.00	5.00	0.17	0.00
57.00	5.00	0.17	0.00
58.00	5.00	0.17	0.00
59.00	5.00	0.17	0.00
60.00	5.00	0.17	0.00
61.00	5.00	0.17	0.00
62.00	5.00	0.17	0.00
63.00	5.00	0.17	0.00
64.00	5.00	0.17	0.00
65.00	5.00	0.17	0.00
66.00	5.00	0.17	0.00
67.00	5.00	0.17	0.00
68.00	5.00	0.17	0.00
69.00	5.00	0.17	0.00
70.00	5.00	0.17	0.00
71.00	5.00	0.17	0.00
72.00	5.00	0.17	0.00